CLAIMS

What is Claimed is:

1. A voltage regulation circuit using current feedback, comprising:

a reference current source capable of producing a reference current;

a current feedback loop comprising:

an output device having a control terminal;

a voltage to current converter coupled to said output device, a regulated voltage at a node of said voltage to current converter; and

a current feedback element coupled to the voltage to current converter to provide a feedback current from said voltage to current converter to compare with said reference current to produce an error signal that is coupled to said control terminal, wherein the current feedback loop regulates the voltage at the node of said voltage to current converter.

2. The circuit of Claim 1, wherein the reference current source is capable of producing a reference current that is proportional to absolute temperature (PTAT).

3. The circuit of Claim 2, wherein the voltage to current converter comprises a negative temperature coefficient element and an element that

is configured to substantially cancel said negative temperature coefficient by passing said PTAT current.

4. The circuit of Claim 1, wherein said voltage to current converter is configured to regulate the voltage at the node by passing said feedback current.

5. The circuit of Claim 1, wherein said voltage to current converter comprises a diode and an impedance device.

6. The circuit of Claim 1, further comprising a device that produces said error signal by running through the device a current formed by the comparison of said reference current to said feedback current.

7. The circuit of Claim 1, wherein said voltage to current converter comprises a transistor configured as part of a current mirror.

8. A circuit having a voltage regulated by a reference current, comprising:

an output transistor having a control terminal, said output transistor coupled to an output node;

a voltage to current converter coupled to said output transistor, wherein a regulated voltage is at a node of said voltage to current converter;

a reference current source coupled to said control terminal of said output transistor and producing said reference current; and

an element coupled to the voltage to current converter to provide a feedback current from said voltage to current converter to compare with said reference current to produce a control voltage that is input to said control terminal, wherein said control voltage controls said output transistor to produce said feedback current to said voltage to current converter and an output current to said output node.

9. The circuit of Claim 8, wherein the voltage to current converter is configured to regulate the voltage at the node by passing the feedback current through said voltage to current converter.

10. The circuit of Claim 8, wherein the control voltage controls the output transistor to deliver an output current whose magnitude depends on load impedance.

11. The circuit of Claim 8, wherein said voltage at the node is regulated without a reference voltage.

12. The circuit of Claim 8, wherein said voltage at the node is regulated without a differential amplifier.

13. The circuit of Claim 8, wherein the reference current is proportional to absolute temperature (PTAT).

14. The circuit of Claim 13, wherein the voltage to current converter comprises a negative temperature coefficient element and an element that is configured to substantially cancel said negative temperature coefficient by passing said PTAT current.

15. A method of regulating a voltage with current feedback, comprising:

a) producing a reference current;

b) producing a feedback current based on said voltage;

c) comparing said reference current with said feedback current to produce an error signal; and

d) regulating said voltage by using said error signal to control an output device.

16. The method of Claim 15, wherein said d) comprises controlling the output device to output a suitable current for said feedback current and any output current provided to a load impedance coupled to the voltage.

17. The method of Claim 16, wherein impedance of said load impedance is variable.

18. The method of Claim 15, wherein said a) comprises producing a proportional to absolute temperature (PTAT) current.

19. The method of Claim 15, wherein said d) comprises running said feedback current through a component having a negative temperature coefficient and a component to compensate for said component with a negative temperature coefficient.

20. The method of Claim 15, wherein said c) comprises running an error current, which is produced by said comparing said reference current with said feedback current, through the impedance of a transistor to produce said error signal.